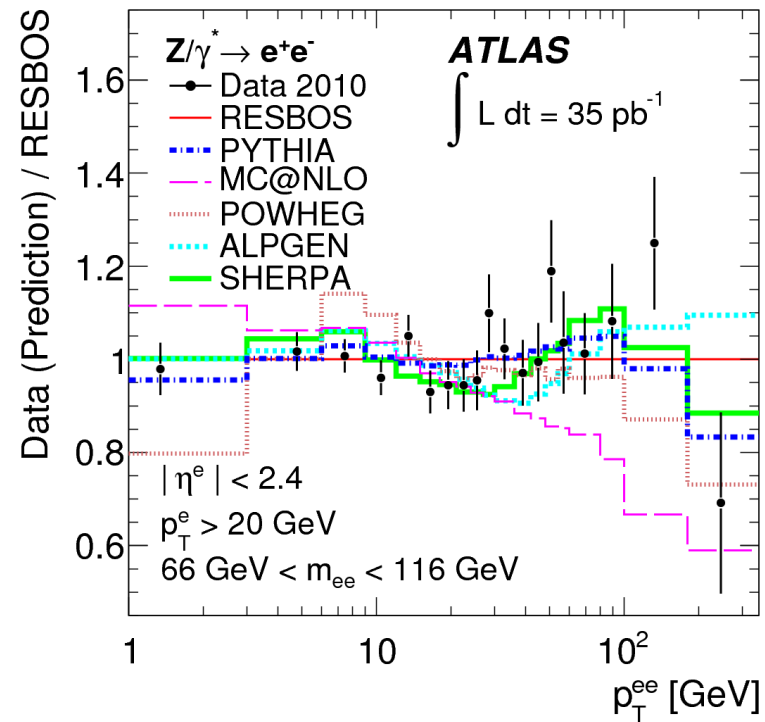
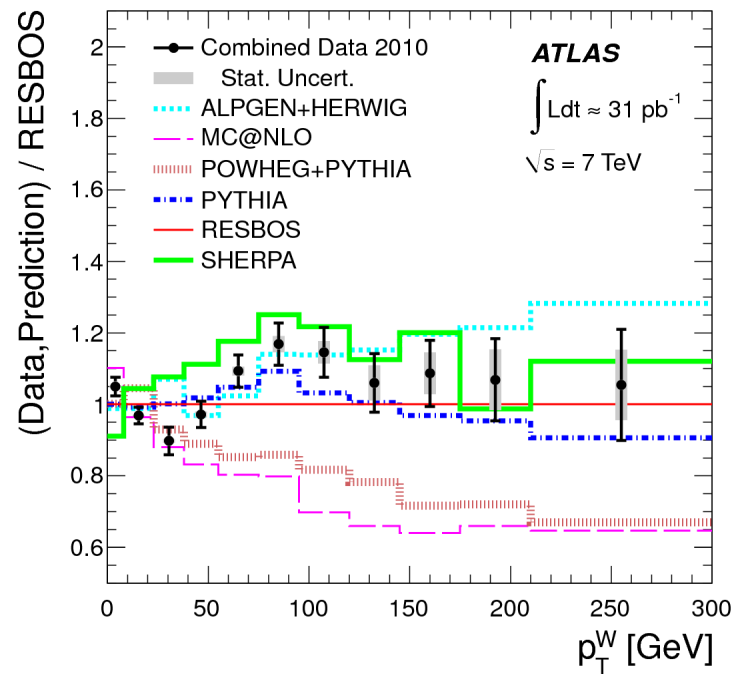


W pt and Z pt

- Wpt one of the key ingredients which limit precision W mass measurement
- Wpt resolution limited, use more precise Z pt related observables to estimate uncertainties on Wpt
- Large differences observed with NLO generators at low pt



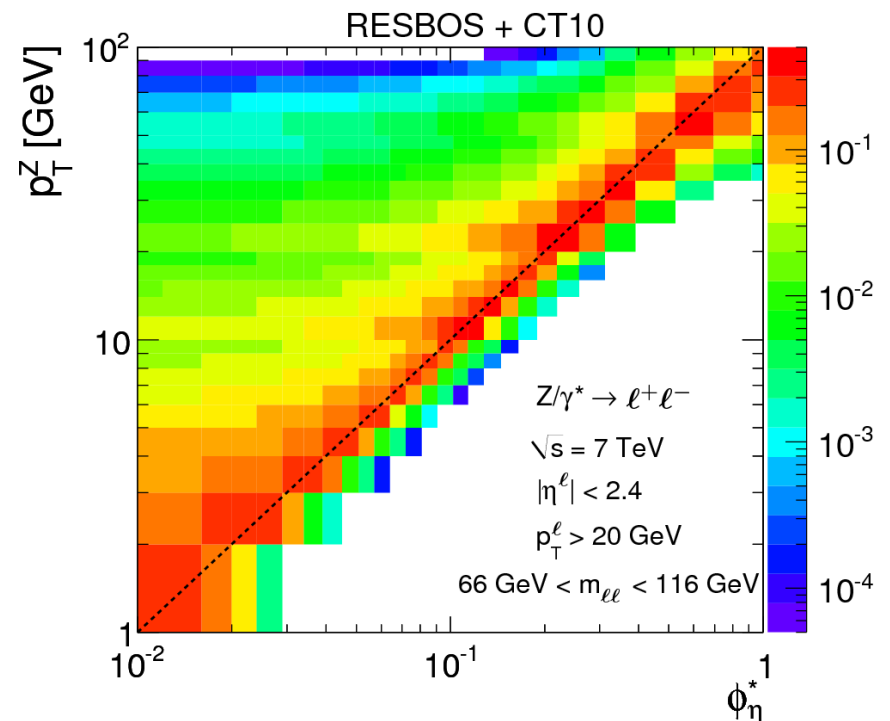
Z pt and Z phi *

- Zpt precision limited due to experimental resolution at low pt, define new variable Z phi* which is highly correlated with Zpt but has better resolution in this region

Z phi*:

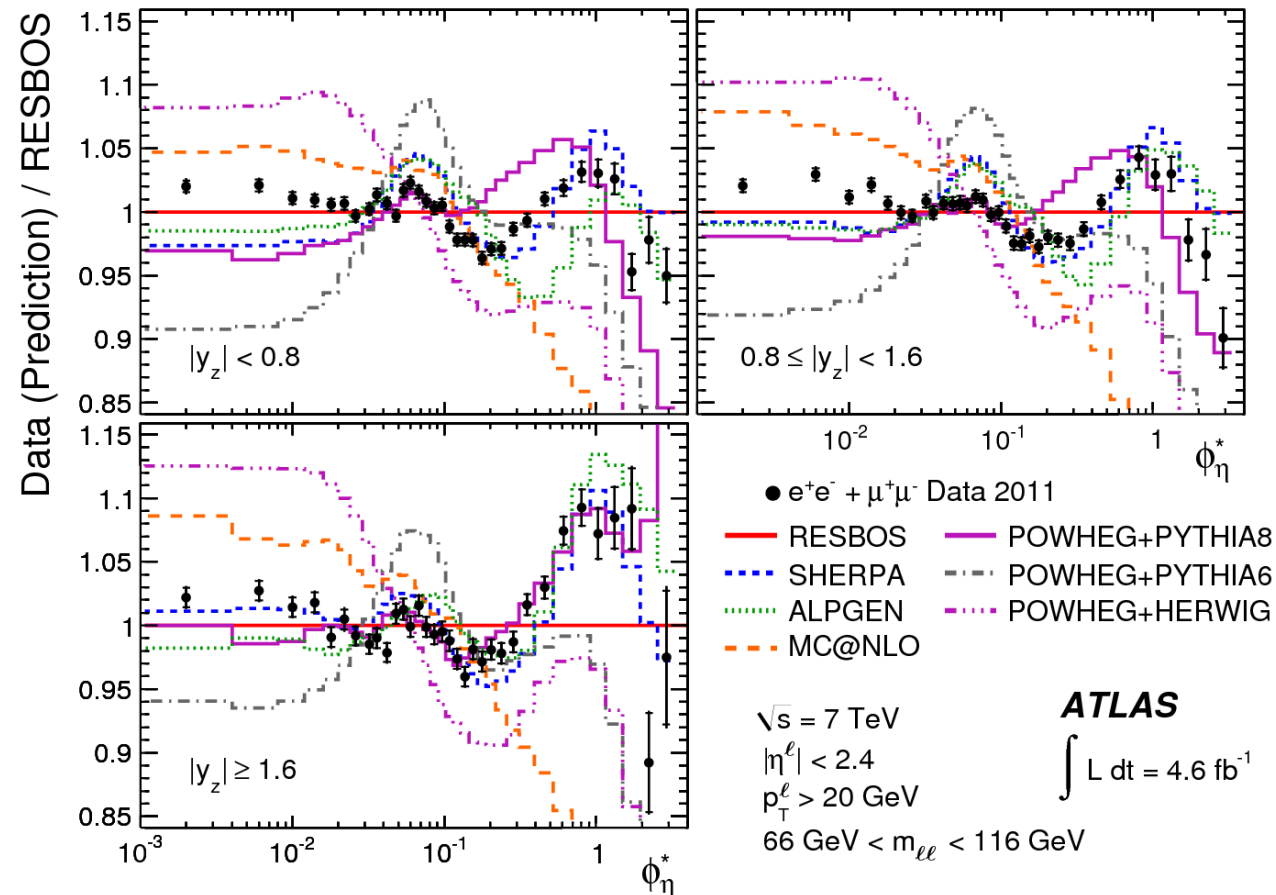
- Reconstructed from angular correlation between decay leptons
- Highly correlated to Zpt, but significantly better experimental resolution at low Zpt

$$\phi_{\eta}^* \equiv \tan(\phi_{\text{acop}}/2) \cdot \sin(\theta_{\eta}^*), \quad \phi_{\text{acop}} \equiv \pi - \Delta\phi,$$



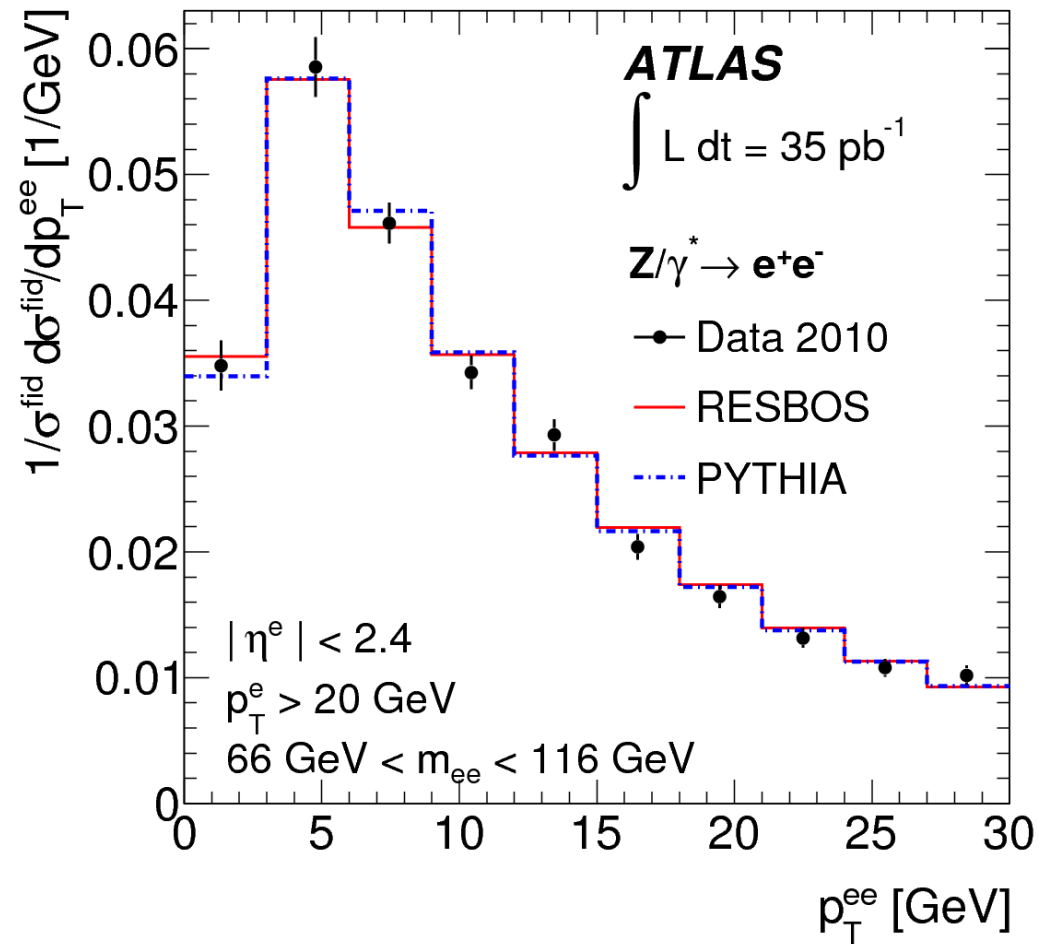
Z pt and Z phi*

Phys. Lett. B 720 (2013) 32-51



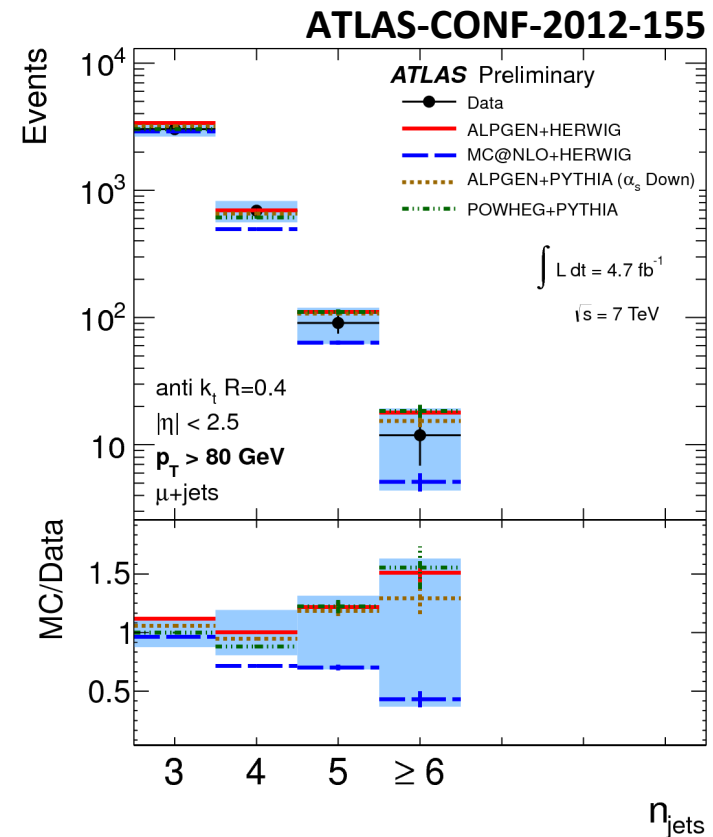
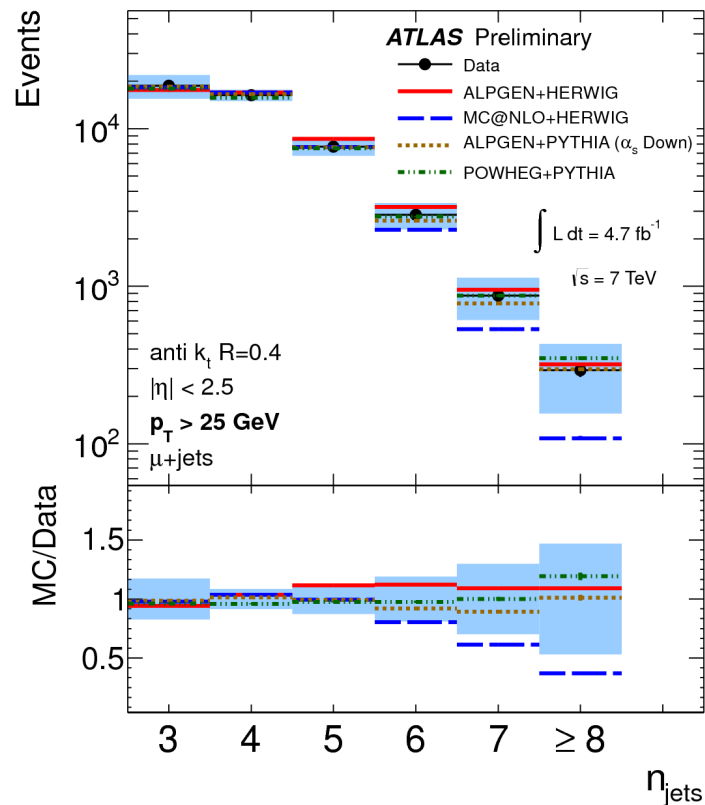
Large variations of POWHEG predictions with parton shower settings
 MC@NLO (+Herwig) smaller deviations, same trend as POWHEG+Herwig
 What is the most realistic estimate of systematic uncertainties?

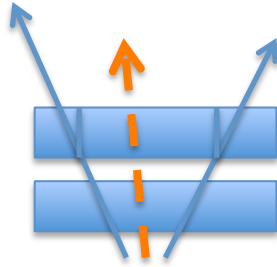
Backup – Zpt details



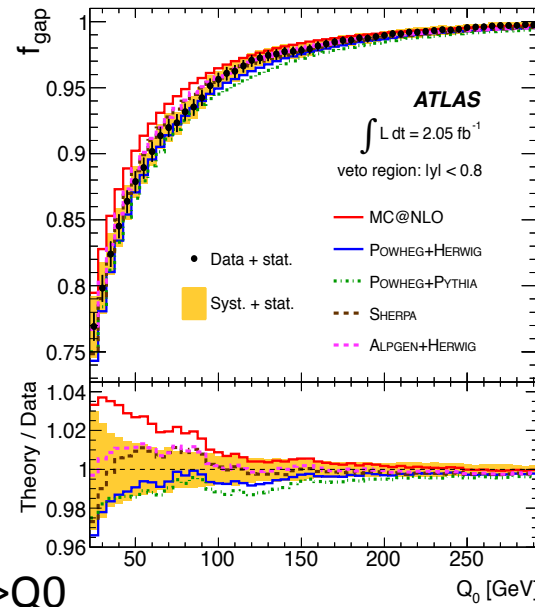
Ttbar+jets

Measure jet production associated with top pair production in semi-leptonic channel,
Requiring at least 3 jets above a varying pt threshold (25 GeV, 40 GeV, 60 GeV, 80 GeV)

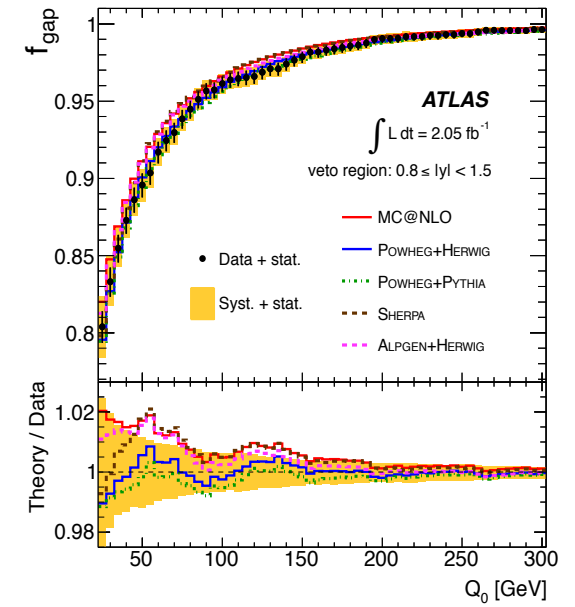




$F_{\text{gap}} = \frac{\text{\#events with additional jet } p_t > Q_0}{\text{all } t\bar{t} \text{ events}}$



(a)



(b)

